

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of May 16, 2005 is respectfully requested.

In view of the Amendment filed March 2, 2005, claims 1-21 and 30-32 are presently pending in this application. In the outstanding Office Action, the Examiner rejected claims 1-9 and 12-19 as being anticipated by the Brunelli reference (USP 5,957,750); rejected claims 11 and 21 as being unpatentable over the Brunelli reference in view of the Yang reference (USP 6,749,484), the Monroe reference (USP 6,227,939) or the Wise reference (USP 6,020,262); rejected claims 10 and 20 as being unpatentable over the Brunelli reference in view of the Yang reference; and rejected claims 30-32 as being anticipated by, or obvious in view of, the Brunelli reference. However, the pending claims have now been amended as indicated above to clarify the distinctions between the present invention and the prior art. Thus, for the reasons discussed below, it is respectfully submitted that the amended claims are clearly patentable over the prior art of record.

The present invention is directed to a method and apparatus for polishing the workpiece, and has been developed in order to address a specific problem in the prior art. In particular, as explained on page 3, lines 4-8 and page 11, lines 16-28 of the original specification, if a workpiece is polished by a polishing tool at a temperature equal to or higher than a glass transition temperature of the polishing tool, then the binder resin of the polishing tool will become soft and particles of the binder resin will attach themselves to the workpiece. After the binder resin particles become attached to the workpiece, the particles cannot easily be removed. At the least, an additional clearing process is then required, and this makes it difficult to efficiently process the workpiece in a short period of time.

In order to address the above problem, the present invention provides a method and apparatus for polishing a workpiece, in which the workpiece is pressed against a polishing tool so as to polish the workpiece with abrasive particles. The polishing tool is kept (i.e., maintained) at a temperature lower than a glass transition temperature of the polishing tool *throughout the period of time during which the workpiece is pressed against the polishing surface of the polishing tools*. In other words, during the time in

which the workpiece is being polished by being pressed against the polishing tool, the polishing tool is maintained at a temperature below the glass transition temperature of the polishing tool. Therefore, as explained on page 12, lines 1-10 of the original specification, the material of the polishing tool is maintained in a glass state and prevented from becoming attached to the surface of the workpiece being polished. Thus, costly and inefficient additional cleaning processes for the workpiece are unnecessary.

In the remarks submitted with the Amendment filed on March 2, 2005, the Applicants emphasized that the Brunelli reference does not disclose or suggest that the polishing tool or a processing circumstance is *kept* at a temperature lower than a glass transition temperature of the polishing tool. In response, the Examiner noted in the outstanding Office Action that the planarizing surface of the polishing tool of the Brunelli reference can “approximately” attain its glass transition temperature, including reaching temperature levels of 98% of the glass transition temperature. Thus, the Examiner asserted that “on the occasion, where the temperature does not reach the transition temperature, Brunelli reads on the claims as recited.” Although the Applicant submits that the term “kept” still distinguishes the original claims from the Brunelli reference, the Examiner’s point is acknowledged. Therefore, the Applicant has now further amended the claims so as to address the Examiner’s comments and further clarify the distinctions between the present invention and the prior art, as explained below.

Firstly, as noted by the Examiner, the Brunelli reference teaches that the planarizing surface is heated to a temperature in the range of approximately 98% to approximately 103% of the glass transition temperature of the polishing pad material. Thus, it is clear that the temperature of the polishing tool varies between 98% and 103% of the glass transition temperature of the polishing tool throughout the period of time during which the workpiece is polished. In other words, although the polishing tool of the Brunelli reference might “on occasion” fall to a temperature below the glass transition temperature of the polishing tool, the Brunelli reference does not disclose or suggest that the polishing tool is *kept* at a temperature *lower* than a glass transition temperature of the polishing tool *throughout the period of time during which the workpiece is pressed against the polishing surface of the polishing tool*. Consequently, it is submitted that the Brunelli reference does not anticipate amended independent claims 1, 12, or 13.

Moreover, it is submitted that the Brunelli reference also does not even suggest keeping a polishing tool at a lower temperature as recited in any of the amended independent claims. In this regard, as explained above, the Brunelli reference teaches maintaining the temperature of the polishing tool in a range of approximately 98% to approximately 103% of the glass transition temperature of the polishing tool. In addition, the Brunelli reference discloses several other embodiments in which the polishing tool is heated to even higher temperatures, although the temperature of the polishing tool should never fall below 98% of the glass transition temperature (see column 3, lines 35-39 of the Brunelli reference), and should preferably be maintained at temperatures well above the glass transition temperature (see column 7, lines 8-20 of the Brunelli reference). Furthermore, the Brunelli reference repeatedly describes “heating” a polishing tool to “at least” a temperature approximately equal to its glass transition temperature (see, e.g., column 6, lines 54-58). In fact, the Brunelli reference teaches that heating the polishing tool to levels at or above its glass transition temperature will cause “the polishing pad material to soften and become easier to remove” (see column 6, lines 58-59). Thus, the Brunelli reference at least strongly suggests maintaining a temperature of the polishing tool well above a glass transition temperature of the polishing tool, which is completely contrary to the present invention. Therefore, it is submitted that the Brunelli reference also does not even *suggest* the present invention so as to motivate one of ordinary skill in the art to obtain the invention recited in amended independent claims 1, 12, and 13.

The Yang reference, the Monroe reference, and the Wise reference also do not disclose or even suggest a polishing method and apparatus for polishing a workpiece, in which a polishing tool is *kept* at a temperature lower than a glass transition temperature of the polishing tool *throughout the period of time during which the workpiece is pressed against the polishing surface of the polishing tool*. Therefore, one of ordinary skill in the art would not be motivated by these references so as to modify the Brunelli reference in order to obtain the invention recited in amended independent claims 1, 12, and 13. Accordingly, it is respectfully submitted that the amended independent claims and the claims that depend therefrom are clearly patentable over the prior art of record.

In addition to the distinctions discussed above, several of the pending dependent claims also recite subject matter that further distinguishes the present invention from the

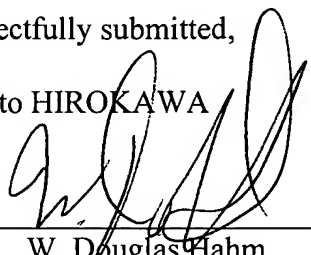
prior art as applied by the Examiner. In particular, dependent claims 3, 7, 8, 14, 17, 18, and 30-32 all recite subject matter describing a step or component for *cooling* a polishing tool. Although all of these dependent claims were rejected in view of the Brunelli reference, the Brunelli reference does not teach or even suggest *cooling* a polishing tool. In direct contrast, the Brunelli reference teaches *heating* a polishing tool in order to reach temperatures at or above a glass transition temperature, as explained above. Thus, it is submitted that the Brunelli reference actually teaches away from the subject matter recited in these dependent claims. Accordingly, it is respectfully submitted that, in addition to the reasons discussed above with respect to the independent claims, dependent claims 3, 7, 8, 14, 17, 18, and 30-32 are clearly patentable over the prior art of record.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance. However, if the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact the Applicant's undersigned representative.

Respectfully submitted,

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